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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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FLIESLER DUBB MEYER & LOVEJOY, LLP
FOUR EMBARCADERO CENTER
SUITE 400
SAN FRANCISCO, CA 94111

EXAMINER

CHU, KIM KWOK

ART UNIT PAPER NUMBER

2653

DATE MAILED: 10/23/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/465,592

Applicant(s)

CULVER ET AL.

Examiner

Kim-Kwok CHU

Art Unit

2653

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-60 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 12, 20, 21, 24-28, 30, 31, 34-39, 47, 48 and 52-56 is/are rejected.
- 7) ☒ Claim(s) 10, 11, 13-19, 22, 23, 29, 32, 33, 40-46, 49-51 and 57-60 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3 and 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 27 and 37 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

(a) in claim 27, line 4, the term "said track and sector" lacks an antecedent basis; and

(b) in claim 37, line 2, the term "said receptor" lacks an antecedent basis.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

*A person shall be entitled to a patent unless --
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.*

4. Claims 1-9, 12, 24, 25, 30, 31, 34-36, 38, 39, 47 and 48 are rejected under 35 U.S.C. § 102(b) as being anticipated by Koyanagi et al. (U.S. Patent 5,471,064).

Koyanagi teaches a memory apparatus having all of the elements and means as recited in claims 1-9, 12, 24, 25, 30, 31, 34-36, 38, 39, 47 and 48. For example, Koyanagi teaches the following:

(a) as in claim 1, a movable media 4 having a surface 4 for placing anomalies thereon (Figs. 4, 5a, 5b and 5c);

(b) as in claim 1, a moveable reading/writing mechanism 5 comprising a moveable platform (Fig. 4);

(c) as in claim 1, at least one fine tip portion 25 attached to the moveable platform 5 configured to write anomalies and read anomalies on the media surface (Figs. 4, 5a, 5b and 5c);

(d) as in claim 1, a media movement mechanism 401 attached to the moveable media 4 and configured to move the media in response to media control signals (Fig. 4);

(e) as in claim 1, a platform movement mechanism attached to the platform 5 and configured to move the platform in response to platform control signals (Fig. 4);

(f) as in claim 1, the at least one fine tip portion 25 comprises a read/write device configured to cause at least one of molecular aberrations, atomic aberrations, molecular orientation, atomic orientation, electron orientation, magnetic field orientation, atomic or molecular electronic charge, molecular voids, atomic voids, electronic voids, magnetic field

voids, molecular bond states, and crystalline lattice structure on at least the media surface as the anomalies (Figs. 4, 5a, 5b and 5c);

(g) as in claim 2, an i/o device 10a having an addressing port for identifying an address corresponding to an area of the media surface where data is to be one of written and read (Fig. 4; XYZ drive controller 10a identifies an address to be written);

(h) as in claim 2, an i/o port 11, 12 for transferring one of data to be read from and written to the media surface via the at least one fine tip portion (Fig. 4);

(i) as in claim 2, an addressing control device 10a configured to send control signals to each of the media and platform movement mechanisms so that the at least one fine tip portion passes an area on the media surface corresponding to an address identified at the addressing port (Fig. 4; XYZ are the control signals);

(j) as in claim 3, the writing fine tip portion 25 comprises an electromagnetic radiation energy source (Fig. 4; write mode);

(k) as in claim 4, the reading fine tip portion 25 comprises an electromagnetic radiation sensitive receptor (Fig. 4; read mode);

(l) as in claim 5, the writing fine tip portion 25 applies a repositioning force comprising at least one of a mechanical force, chemical force, electrostatic force, electromagnetic radiation, and magnetic field to cause the anomalies (Fig. 4);

(m) as in claim 6, the writing fine tip portion 25 utilizes the repositioning force to at least one of remove and reposition of at least one of atoms, molecules, electrons, and magnetic domains at least one of above, on and below the media surface to cause the anomalies (Fig. 4, 5a, 5b and 5c);

(n) as in claim 7, the reading fine tip 25 is configured to detect at least one of current, voltage electromagnetic radiation, vibration parameters [phase and amplitude] having been one of caused or affected by the anomalies (Figs. 7a and 7b);

(o) as in claim 8, an analysis device 8 configured to analyze at least one of, patterns of current between the reading fine tip and the media surface, patterns of electromagnetic radiation received from the media surface in response to a stimulus patterns of shifting phase of vibrations of the reading fine tip; patterns of changing amplitude of the reading fine tip; and patterns of at least one of current and voltage between the reading fine tip and the media surface (Fig. 4);

(p) as in claim 9, least one of the media movement mechanism 401 and the platform movement mechanism 5 comprises an electrostatic device constructed to move at least one of the media and the platform based on an applied electrostatic potential (Fig. 4);

(q) as in claim 9, an electrostatic control and supply device 12 connected to the addressing control device and configured to apply an electrostatic potential to the electrostatic device to move at least one of the media and the platform to pass the area on the media surface according to the control signals sent by the addressing control device (Fig. 4; electrostatic controller is an inherent feature for driving the tip 25 and media 4);

(r) as in claim 12, a calibration mechanism 9 configured to move the media 4 and the platform 5 to a full extent of a range of motions and determined amounts of electrostatic force needed to move the media 4 to plural positions in relation to the platform (Fig. 1);

(s) as in claims 24 and 25, the media is constructed from a substrate having surface texture on the media (Fig. 5a-c);

(t) as in claim 30, at least one positioning mechanism 5 attached to the platform and at least one of the fine tip portions, the positioning mechanism configured to position the fine tip portion at one of at, above, and below the media

surface while reading, and position the 9 fine tip at one of at, above, and below the media surface while writing (Figs. 3 and 4);

(u) as in claim 31, a cantilever 3 attached to each fine tip portion 1; and an activation/pickup device connected to each cantilever (Fig. 2; column 5, lines 22-36);

(v) as in claim 34, a source 200 configured to produce electromagnetic radiation emanations; and a focusing device 17 configured to direct the emanations to a predetermined location on the media surface (Fig. 2);

(w) as in claim 35, a receptor 201 configured to receive a return of the emanation from the media surface (Fig. 2);

(x) as in claim 36, the source 200 comprises one of a light emitting diode; and the focusing device 17 comprises a waveguide 13 configured to direct a narrow beam from the fine tip (Fig. 2);

(y) as in claim 38, a z-axis mechanism 5 connected to at least one of the fine tip portions 1 and the platform, wherein the z-axis mechanism is configured to place the at least one of the fine tip portions at least one of on and near the media surface (Figs. 1 and 4); and

(z) as in claim 39, each fine tip portion 1 comprises a cantilever 3 having a chamfered tip; and a z-axis drive

mechanism 5 attached to the platform 5 and connected to the cantilever; wherein the z-axis drive mechanism is configured to place the cantilever at least one of on and a close proximity to the media surface (Figs 1 and 4).

5. Method claims 47 and 48 are drawn to the method of using the corresponding apparatus claimed in claims 1 and 34-36. Therefore method claims 47 and 48 are correspond to apparatus claims 1 and 34-36 are rejected for the same reasons of anticipation (obviousness) as used above.

6. Claims 52-55 are rejected under 35 U.S.C. § 102(b) as being anticipated by Koyanagi et al. (U.S. Patent 5,471,064).

Koyanagi teaches a method of making a media for storing data in the form of anomalies on a surface of the media having all of the steps as recited in claims 52-55. For example, Koyanagi teaches the following:

(a) as in claim 52, texturing the surface of the media 4 (Figs. 5a-c show texturing steps);

(b) as in claim 53, coating the media surface with a material; and removing the material coating (Figs. 5a-c show a coating material 26 and removing material 27);

(c) as in claim 54, the texturing produces a lumpy pattern 26, 27 on the media surface (Figs. 5a-c); and

(d) as in claim 55, the texture formed in a random pattern on the media surface at approximately 30-50 nanometers spacing (Figs. 5a-c; 30-50 nanometer spacing is the typical range of a STM/AFM).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyanagi et al. (U.S. Patent 5,471,064) in view of Adderton et al. (U.S. Patent 6,196,061).

Koyanagi teaches a memory apparatus very similar to that of the present invention as disclosed in above 102 rejection (item 3). In addition, Koyanagi teaches the following:

(a) as in claim 20, the drive mechanism 5 includes actuators, coupling rod 21, electrical paths and electrical supplies (Fig. 3); and

(b) as in claim 21, a sensor 8 configured to detect an amount of movement of the actuators; wherein the sensor provides feedback to a control device regulating an amount of the electricity supplied.

However, Koyanagi does not teach the following:

(a) as in claim 20, the media movement mechanism and the platform movement mechanism comprises a thermal drive mechanism.

Adderton teaches the following:

(a) the platform movement mechanism comprises a thermal drive mechanism 154 (Fig. 2; column 13, lines 10 and 11).

A scanning probe is generally driven by a piezo-electric actuator. On the other hand, a thermal actuator has a higher image quality because of its longer actuating range. When there is an advantage of extending a scanning probe closer to a scanned object such as Koyanagi's recorded data, it would have been obvious to one of ordinary skill in the art at the time of invention to replace Koyanagi's piezo-electric probe actuator with Adderton's thermal actuator, because the thermal actuator can drive the probe closer to the recording surface which

results in lower noise and higher reliability in accessing data.

9. Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyanagi et al. (U.S. Patent 5,471,064) in view of Mamin et al. (U.S. Patent 5,804,710).

Koyanagi teaches a memory apparatus very similar to that of the present invention. However, Koyanagi does not teach the following:

(a) as in claim 26, the media comprises a substrate having a surface with track and sector marks; and

(b) as in claim 27, an alignment device configured to move the media and the platform such that the at least one fine tip portion moves across the track and sector marks and calibrate the media movement mechanisms based on detection of the track and sector marks by the at least one fine tip portion.

Mamin teaches a memory device having tracks, sector marks and alignment device as in above (a) to (c) (Figs. 1 and 8; column 10, lines 2-7).

Although Koyanagi does not teach that his recording medium has tracking means such as tracks and sector marks, however, tracking a recording medium is a required scanning mechanism because it aligns a scanning head in a proper position with

respect to the recording medium. For example, Mamin teaches tracks and sector marks which can be accessed by a scanning probe. Hence, it would have been obvious to one of ordinary skill in the art at the time of invention to align a scanning fine tip such as Koyanagi with tracks and sector marks such as Mamin's, because the tracks and sector marks deflect Koyanagi's scanning tip which then generates servo signals to calibrate the XYZ driving devices.

10. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koyanagi et al. (U.S. Patent 5,471,064) in view of Miyazaki et al. (U.S. Patent 5,412,597).

Koyanagi teaches a memory apparatus very similar to that of the present invention. However, Koyanagi does not teach the following:

(a) as in claim 28, at least one fine tip portion comprises an arm having a chamfered tip coated in a ferromagnetic material; and

(b) as in claim 28, the fine tip portion is configured to detect at least one of magnetic domains and magnetic domain voids on the media surface.

Miyazaki teaches a scan type magnetic force microscope having a ferromagnetic tip to detect magnetic domains and voids on a media surface (column 13, lines 58-68).

A scanning tunnel probe such as Applicant's can be operated in an AFM mode such as Koyanagi's or a MFM mode such as Miyazaki's. In other words, instead of detecting atomic force on a media surface with Koyanagi's AFM tip, magnetic orientation on the media surface can be detected as well. As an alternative of forming Applicant's read/write device, it would have been obvious to one of ordinary skill in the art at the time of invention to replace Koyanagi's AFM tip with Miyazaki's MFM tip, because the MFM tip can detect local magnetic force of an anomalies formed on the media surface.

11. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koyanagi et al. (U.S. Patent 5,471,064) in view of Tanaka (U.S. Patent 5,808,973).

Koyanagi teaches a memory apparatus very similar to that of the present invention. However, Koyanagi does not teach the following:

(a) as in claim 37, the receptor comprises a polarizing film and a photodiode.

Tanaka teaches a photodetector 37 with a polarizer 38 (Fig. 2).

When Applicant's scanning device uses as a magnetic recording/reproducing apparatus such as Tanaka's, the reflected electromagnetic wave is polarized. It is required to remove

the polarization in order to reproduce the original orientation of the wave. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace Koyanagi's laser irradiating head and photodetector 201 with Tanaka's head member 2, because the head member of Tanaka's photodetector has a polarizer means which can eliminates unwanted polarized electromagnetic wave reflected from the media.

12. Claims 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyanagi et al. (U.S. Patent 5,471,064) in view of Yang et al. (U.S. Patent 6,001,519).

Koyanagi teaches a method of making a media for storing data in the form of anomalies on a surface of the media very similar to that of the prevent invention. However, Koyanagi does not teaches the following:

(a) as in claim 56, the material is a PMMA material.

Yang teaches a high molecular weight information recording medium having a PMMA layer 3 (Fig. 2A).

A typical recording medium where its recorded marks are not stable under an electron density storage device such as Koyanagi's. To improve the reliability of the recording medium, it would have been obvious to one of ordinary skill in the art at the time of invention to use a PMMA type recording

medium such as Yang's, because under room temperature, the data formed in the PMMA layer can be maintained intact for a long time.

Allowable Subject Matter

13. Claims 10, 11, 13-19, 22, 23, 29, 32, 33, 40-46, 49-51 and 57-60 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

14. The following is an Examiner's statement of reasons for the indication of allowable subject matter:

As in claim 10, the prior art of record fails to teaches or fairly suggest that the electrostatic device comprises a series of prong sets, wherein, the prong sets are attached in series such that a first of the prong sets is attached at a first end to a fixed position of the apparatus, and a second end of the first prong set is attached to a first end of a second of the prong sets, and so on, until a last of the prong sets is attached at a first end to a second end of an $n-1$ prong set, and a second end of the last (n) prong set is attached to one of the media and the platform.

As in claim 22, the prior art of record fails to teaches or fairly suggest that wherein the capacitance sensor comprises a fixed comb having fingers protruding in an x-axis direction, a moving comb connected to the coupling having fingers protruding in an x-axis direction and interleaved among the fingers of the fixed comb.

As in claim 23, the prior art of record fails to teaches or fairly suggest that a capacitive comb array comprises a fixed comb and a moving comb each having a set of fingers interleaved between the other set of fingers.

As in claim 29, the prior art of record fails to teaches or fairly suggest that a re-planing device configured to remove at least 4 part of each anomaly on the media surface.

As in claim 32, the prior art of record fails to teaches or fairly suggest that the activation/pickup device is at least one of electrostatically and capacitively activated causing the cantilever to vibrate near a resonance frequency of the cantilever; and the activation/pickup mechanism is configured to detect a phase change of vibrations of the cantilever caused by the fine tip interacting with the media surface via at least one of electrical, magnetic, and physical forces.

As in claim 33, the prior art of record fails to teaches or fairly suggest that a cleaning device configured to remove unwanted 4 particles from the fine tip.

As in claims 40 and 41, the prior art of record fails to teaches or fairly suggest that the z-axis drive mechanism comprises a cantilever connected to the fine tip portion at one end, and at least one set of comb fingers rotatably attached to the platform allowing movement of the cantilever and the fine tip portion in at least a z-axis direction.

As in claim 43, the prior art of record fails to teaches or fairly suggest that the z-axis drive mechanism comprises a lever connected to the fine tip portion at one end; a torsion bar connected at a second end of the lever; an isolation bridge connected at one of the second end of the lever and the torsion bar; a second torsion bar connected to the isolation bridge.

As in claim 45, the prior art of record fails to teaches or fairly suggest that the z-axis drive mechanism comprises a lever connected to the fine tip portion at one end; a thermal bimorph, comprising a heater, and at least two materials of different expansion coefficients; wherein a current applied to the heater raises the temperature of the bimorph, causing the bimorph to expand or contract and move the lever and the fine tip portion in a z-axis direction.

As in claim 49, the prior art of record fails to teaches or fairly suggest that a cantilever having the fine tip attached at a first end; a moving assembly attached to the cantilever, comprising, a torsion bar electrically isolated and

attached to the cantilever, and a force receiver attached to the cantilever and configured to apply force to the cantilever.

As in claim 57, the prior art of record fails to teaches or fairly suggest that nubs are placed between the media and the platform for providing a bearing for movement of the platform relative to the media.

As in claim 58, the prior art of record fails to teaches or fairly suggest that the media comprises an amplifying media having electrodes at ends of the media, and a control area activated by the tips.

As in claim 59, the prior art of record fails to teaches or fairly suggest that the media comprises a material having energy wells with increased capacitance for storing data on the media.

15. Any response to this action should be mailed to:

Commissioner of Patents and Trademarks Washington, D.C.
20231 Or faxed to:

(703) 872-9314 (for formal communications intended for
entry. Or:

(703) 746-6909, (for informal or draft communications,
please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park
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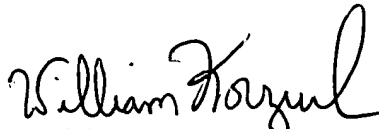
Any inquiry of a general nature or relating to the status
of this application should be directed to the Group
receptionist whose telephone number is (703) 305-4700.

Any inquiry concerning this communication or earlier
communications from the examiner should be directed to Kim CHU
whose telephone number is (703) 305-3032 between 9:30 am to
6:00 pm, Monday to Friday.

1cc 10/18/02

Kim-Kwok CHU
Examiner AU2653
October 18, 2002

(703) 305-3032


WILLIAM KORZUCH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800